

Time Trend Analyses for Residential Properties:

Phase I Report

by

Almy, Gloudemans, Jacobs & Denne

for

Montana Department of Revenue

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The AGJD's study team was headed by Robert Gloudemans, and its members included Richard Almy and Robert Denne.

EXECUTIVE SUMMARY

The Montana Department of Revenue contracted with Almy, Gloudemans, Jacobs & Denne (AGJD) for an independent analysis of Montana's residential housing market, assistance in completing the reappraisal market modeling effort, an evaluation of key trends and policy issues, and recommendations for reducing the current six-year revaluation cycle and improving future sales verification and reappraisal processes. The work is to be completed in two phases. This report presents the findings of Phase I in which we conduct a preliminary analysis of trends in property values since January 2003, offer an analysis of probable trends for the remainder of 2008, and make recommendations for implementing the revaluation.

We conclude that all major economic areas in the State saw strong growth in property values from 2003 through sometime in 2007, after which values begin declining modestly in many areas but remained stable or even increased in others. We project that general weakness will persist through 2008 but that Montana will not see the housing problems seen in parts of the country that saw much larger and unsustainable growth, particularly in 2004 and 2005.

Despite this general weakness, the revaluation will result in value increases of one-third or more (often far more) in almost all areas of the State due to the six-year lag in Montana's revaluation cycle. Thus, value notices will reflect large increases accumulated over the past six years at a time when values are generally weak and often declining. Against this background we recommend (assuming the legal framework will permit) that the Department target values as close to July 1 in model development and January 1, 2009 in post-model adjustments so as to reflect as near a possible market conditions through the end of 2008. As part of this process, the Department should continue to monitor price trends, develop explicit time trend adjustments, and use those adjustments in its valuation models and post-model adjustments. This will enable the Department to stay on top of the market and to quantify, articulate, and adjust for market conditions. Finally, we recommend that the Department reduce the current six-year revaluation cycle to no more than three years, which will help ease the impact and timing complications of future revaluations. Our Phase II work will be aimed at assisting the Department in these areas.

1. TIME TRENDING BACKGROUND

Housing prices experience changes over time. Therefore any attempt to model property values, as for establishing the base of the ad valorem property tax, must take account of those changes if the model is to reasonably approximate property values at a fixed point in time, the assessment date, based on indicators of property value, namely sale prices, that are collected over a broad period of time. This issue takes on added urgency when the results of the modeling effort remain fixed for a protracted period of time, such as the six years that intervene between assessment cycles in Montana, and when unusual circumstances arise, such as the turmoil that arose in the housing credit market in late 2007 and worsened in 2008. Several methods of accounting for time in such contexts are available, with each characterized by a different likelihood of accuracy.

One of the most widely reported indicators is the average price of homes sold in each of a succession of periods, usually months or quarters. Such statistics, however, are heavily influenced by changes in the mix of properties sold in the different time periods. This can be heavily influenced by homebuilders as they make inventory clearance decisions or strategic moves to address different market niches.

The series of statistics on the prices of existing home sales offers a somewhat more stable indicator, and is considerably more useful for economists attempting to build macro-economic models of the nation's economy. But even such data suffer from very significant problems of changes in the nature of the objects being sold from one period of time to another – what price-index specialists call the “quality problem.” The desire, of course, is to have a constant “basket of goods,” as the consumer price index does, so that the changes in the index reflect only the effects of time (or inflation) and not shifts in consumer preferences, as from ranch houses to more complex design types.

Keeping property characteristics constant while measuring the effects of time presents significant problems. Two housing price indices that attempt to do so are the Case-Shiller index and the index published by the Office of Federal Housing Enterprise Oversight (OFHEO)¹. Both indices are based on resales, that is, individual properties that have sold more than once in a reasonably short period of time, with the assumption being that there were no significant changes to the properties between sales. This approach has the virtue of attempting to hold constant property characteristics, without actually having to obtain detailed data on those characteristics, let alone having to develop implicit prices for the relevant characteristics. Counterbalancing the minimal data requirements of such models are problems of sampling. The number of properties that sell more than once in a reasonable period of time is a small percentage of valid sales during the same period and hence samples are smaller and derived statistics less reliable. In addition,

¹ On July 30, 2008, the Housing and Economic Recovery Act of 2008 combined OFHEO and the Federal Housing Finance Board (FHFB) to form the new Federal Housing Finance Agency (FHFA).

properties may have been remodeling or may have otherwise changed between sale and resale, and properties that resold may differ somewhat from the totality of the market (e.g., include a disproportionate number of post-foreclosure sales)².

Assessors, unlike macro economists at the national level, are in possession of a much richer body of data on housing characteristics, and are therefore in a position to develop superior estimates of the effects of time exclusive of any confounding effects of property characteristics. There are two ways in which they may do this, and ideally both should be employed, one preceding the other. The first way is to control for differing property characteristics by means of their assessed values, a practice that depends on an assumption that their assessed values were established with reasonable accuracy in the first place, based on their property characteristics. This method, known as Sales Ratio Trend Analysis and described more fully on pages 265-268 of *Mass Appraisal of Real Property*³, was the one adopted for this report.

The best method of adjusting sales prices for time, uniquely available to assessors, is to incorporate time as an explicit factor in the development of mass appraisal models based on multiple regression analysis. It is described on page 269 of *Mass Appraisal of Real Property*. Whereas Sales Ratio Trend Analysis uses existing assessed values to control for house characteristics, the Multiple Regression Method controls for them directly through variables constructed from such relevant features as living area, lot size, construction grade, and location. Since existing assessments may be outdated and are dependent in the first place on the accuracy of prior valuation models, this method allows the analyst to better control for such characteristics and thus develop more accurate time adjustments. However, development of such models is an iterative process that can benefit from the development of preliminary price trends based on Sales Ratio Trend Analysis. These preliminary adjustments allow the analyst to compare prices by neighborhoods, housing styles, and other characteristics more effectively during early stages of market analysis. These preliminary trends can then be refined by the Multiple Regression Method once variables to be included in the final model have been specified. Consulting on the details of such processes is an element of Phase II of the present engagement, of which this is only the Phase I report. The following section details the results of our analyses using the Sales Ratio Trend Method.

² While excluding foreclosure deed, The Schiller-Case index includes sales by financial institutions of repossessed properties (what are commonly termed REO or “real estate owned” sales). The OFHEO index is based on sales with conforming loans (less than \$417,000) and refinancing that were reviewed or approved by Fannie Mae or Freddie Mac. It covers all SMSAs. The Case-Shiller Index is based on single family arm’s-length sales (excluding condominiums) regardless of mortgage amount but covers only 20 major metropolitan areas. The Case-Shiller index is updated monthly and the OFHEO index quarterly. Both have a two-month reporting lag.

³ Robert J. Gloudemans, *Mass Appraisal of Real Property* (IAAO, 1999).

Zillow develops trend indices (termed the Zindex) for 125 metropolitan areas (including Billings, Great Falls, and Missoula)⁴. The indices are based on Zillow's estimates of housing values (termed Zestimates) which are updated several times a week based on complex, proprietary statistical algorithms that include multiple regression analysis and pattern recognition techniques. While Zestimates can suffer in accuracy due to data inadequacies, the Zindex for a zip code, city, or county should be quite accurate as it is based on an aggregation of Zestimates, so that under-value and over-value estimates can be expected to largely cancel out. When compared across SMSA's served by all three indices, the Zindex tracks quite closely with the Case-Shiller index, while the OFHEO index differs considerably.

⁴ See www.zillow.com.

2. TIME TREND ANALYSES

In recognition of the diverse economic regions in the State, the Department of Revenue has identified nine major economic areas within which properties are subject to similar market forces and tend to change in value at similar rates despite inevitable local variations therein. These areas were chosen as the basis for our analyses of time trends via the Sale Ratio Trend method since they provide complete coverage without the need to conduct detailed localized analyses that were not feasible given time and resource constraints and are more appropriately scheduled for Phase II. Table 1 below shows the composition of the nine economic areas.

Table 1. Composition of Economic Areas

Area 81:	Flathead and Lake counties
Area 82:	Cascade, Fergus, Hill, Chouteau, Toole, Blaine, Pondera, Teton, Judith Basin, Glacier, and Liberty counties (includes Great Falls)
Area 84:	Missoula and Ravalli counties (includes Missoula)
Area 85:	Gallatin, Beaverhead, Madison, and Park counties (includes Bozeman)
Area 87:	Powder, Phillips, Custer, Dawson, Roosevelt Valley, Big Horn, Richland, Rosebud, Treasure, Sheridan, Daniels, Fallon, McCone, Carter Prairie, Garfield, Wibaux, and Petroleum counties
Area 88:	Yellowstone, Carbon, Musselshell, Stillwater, Sweet Grass, Wheatland, Meagher, and Golden Valley counties (includes Billings)
Area 89:	Lewis & Clark, Broadwater, and Jefferson counties (includes Helena)
Area 90:	Silver Bow, Powell, Anaconda, Deer Lodge, and Granite counties (includes Butte)
Area 91:	Sanders, Lincoln, and Mineral counties

Appendix 1 shows two plots for each economic area. The first is a scatter graph of sale-to-assessment ratios (SARs) and sale month beginning January 2003 (January 2003=1, February 2003=2, etc.) with a moving average trend fitted to the data. The second is a line graph of median SARs with time. Since all assessments used in the analysis are based on existing values (valuation date of January 1, 2002), changes in SARs indicate corresponding changes in market values over the same period. Based on these plots we identified representative break points where the market appeared to have changed either direction or rate of acceleration. These break points are identified by the vertical reference lines in the in the line charts. The break points were selected so as to best capture sustainable trends and thus do not necessarily correspond to the highest or lowest points on the graph. Of course, median SARs are more reliable where sales are plentiful and less reliable where samples are small, as they are for 2008, especially after March 2008.

Time variables were constructed to correspond to the identified break points and regression analysis used to determine the rate of change over each time segment. As a review of the line graphs will show, either two or three time variables were identified in each market area. In cases

with three time spans, the last segment began somewhere in 2007 when the market appeared to flatten or, in some cases, turn downward.

Appendix 2 shows the regression results for each market area. The coefficients (“B”s) represent the indicated rate of change in SARs per month. The “t” values indicate the strength or reliability of the trend (numbers greater than 2 are statistically significant at the 95% confidence level). Clear, strong trends have high t-value, typically over 5 or 6 and sometimes over 20 or even 30. The weakest trends tended to occur for sales toward the end of the study period, where there are fewer sales and patterns are less clear. Table 2, below, summarizes results of the study.

Table 2. Summary of Observed Time Trends

Area	Indicated Monthly Time Trends	Maximum % Increase	Maximum % Decrease	Cummulative % Change
81	0.9% thru Aug 07; -1.4% per month thereafter	61	9	46
82	0.55% thru Oct 06 and no trend thereafter	37	N/A	37
84	0.55% thru June 07; -0.4% per month thereafter	42	4	37
85	0.66% thru June 04; 1.1% thru Sep 06; -0.2% thereafter	51	3	46
87	0.4% thru June 04; 0.6% thru Apr 06; 0.8% thereafter	48	N/A	48
88	0.60% thru Jun 07; 0.43% thereafter	44	N/A	44
89	0.61% thru Dec 04; 1.01% thru Jun 07; -1.06 thereafter	62	9	48
90	0.38% thru Dec 04; 1.04% thru Jun 07; no trend thereafter	51	N/A	51
91	0.0060 thru Jun 04; 1.280 thru Nov 07; -1.48% thereafter	87	9	72

Several cautions should be considered when reviewing the table. First, some counties (Cascade, Flathead, and Missoula) were missing property type, so that the analysis for those counties may include some non-residential parcels that would otherwise have been excluded. Second, the determination of cut points for the time trends was judgmental and often difficult toward the end of the period, where sales were less numerous and patterns less clear. Related to this, the “maximum decreases” shown above must be taken with a grain of salt as their statistical reliability is generally weak. On the other hand, the “cumulative % changes” shown in the final column can be taken as highly reliable as they are based on indicated changes over the entire period (sampling errors for “maximum decreases” in the chart would be offset by sampling errors for “maximum decreases” in the opposite direction.

The chart in Appendix 3 graphically summarizes the price indices implicit in the observed trends. Area 91 on the far northwest side of the State experienced the largest maximum and cumulative percent increases over the study period. Area 82 (which includes Great Falls) and area 84 (which includes Missoula) saw the smallest increases, perhaps because they are less driven by recreation and natural resource influences than much of the rest of the State.

Similarly, Appendix 4 displays time adjustment factors required to adjust sale prices occurring over the span of the study to May 2008, the most recent month for which sales were commonly available. As can be seen in both graphs, all of the economic areas share a similar broad outline through late 2006, although the rates of change were higher in certain areas than in others. Beginning as early as September 2006 in one area, and somewhat later in others, the trajectories

of the various areas began to diverge. Prices continued to rise in Areas 87 and 88, appeared to stabilize in areas 82 and 90, and declined in the other five areas⁵.

The following conclusions can be drawn at this time:

- The market in Montana has been very strong through the majority of the analysis period. In general, values rose steadily in 2003 and 2004 and rose at an ever faster pace beginning in late 2004 or early 2005 through sometime in 2007.
- Toward the middle or end of 2007 markets turned weaker. In some cases values appear to have stabilized and in many cases declined.
- The pattern differs considerably among market areas. Economies based on oil and gas and agriculture have held up better toward the end of the period, and some cases continued to increase in value.

Of course, time trends in individual counties can vary from the overall pattern observed for their economic area. Trends by county and individual model areas will be evaluated during Phase II of the project. That said, the overall trends observed for each of the nine major market areas of the state provide a good overall picture of broad price trends across the state.

Finally, just as it is difficult to draw conclusions about price trends about the first several months of 2008 at this time due to relatively few sales being available; it is even more problematic to project trends into the future. Still, considering the backdrop of national trends, we feel that it is reasonably safe to conclude that markets will not improve during the remainder of 2008 from the slowdown that has been observed in much of the state⁶. Some areas will likely decline in price, while others will simply level off and remain stable or reasonably so. Resource-based areas may continue to see modest increases. These trends will be monitored and re-evaluated as the project proceeds.

⁵ The decline in values of 4% in area 84 (Missoula) through May 2004 and the absence of any decline in area 82 (Great Falls) indicated in Table 2 are virtual identical with results reported by Zillow. On the other hand, Zillow reports a 7% decline in values in Billings and Yellowstone County from a market peak in January 2008 to May 2008, whereas we find no overall change for the same period in area 88. The difference may be explained by the fact that Yellowstone County is only one of eight counties in this economic area, since graphs of SARs with time for area 88 in Appendix 1 show no sustained drop in values from January to May of 2008 .

⁶ Zillow reports a 4-5% decline in prices in the Great Falls and Missoula areas from May to August 2008 and a 1% increase in the Billings area.

3. POLICY ISSUES

The national housing market has been in a clear decline since mid 2006 and as of early July 2008 the consensus estimate among economist was for an additional 10% decline⁷. While Montana cannot help but be effected by these forces and trends, it has a number of factors in its favor, including the somewhat modest increase in prices versus many areas that saw unsustainable increases during 2004 and 2005, its proximity to Canada and the relatively strong markets on that side of the border, and most importantly, its natural resource, agricultural, and recreational economic base (all segments of the economy that have been relatively strong). In addition, the State has been relatively immune to the foreclosure problem that has dumped additional supply onto many metropolitan areas and further exacerbated price declines.

In any case, while we expect Montana to fare comparatively well and housing market declines to be relatively modest, there is clear evidence of softening and declines across much of the State with additional declines more likely than not.

What are the policy implications of this generally weak backdrop? Most obvious is the difficulties created for the pending revaluation. Assessments pegged to historically high price levels in a falling market are always politically difficult. The expedient solution often adopted elsewhere is to fail to assess at 100 percent of market value, with administrators choosing instead to establish assessments at a level thought to be low enough to be consistent with prices prevailing by the time assessment notices are to be sent out. Even this approach is problematic, however, since it is not yet clear to what extent the market will continue to fall.

We make the following recommendations.

First, assuming that the legal framework will permit, the Department should target July 1 rather than January 1, 2008 in its valuation models. While models developed toward the end of the process could target a later date than models developed toward the beginning of the process, we believe it would be cleaner to adopt a common target date in valuation modeling and then adjust values developed therein to a later date based on subsequent studies as explained in our third recommendation below.

Second, as part of the modeling process, the Department should include time variables in it preliminary models (only), determine time trends, and adjust sales prices to the recommended July 1 (or other) target valuation date. *Time-adjusted* sales prices could then be used to develop final valuation models. This stands in contrast to the time variables buried in final models in the

⁷ Recent work from the National Bureau of Economic Research (NBER) suggests that housing prices may have another 15 percent to fall in real (constant dollar) terms based on patterns in past cycles. See Carmen M. Reinhart and Kenneth S. Rogoff, "Is the U.S. Sub-Prime Financial Crisis So Different? An International Historical Comparison". NBER Working Paper No. 13761 (Jan 2008).

prior revaluation. Given the importance, profile, and implications of time trends in the current environment, the Department must be in a position to develop, know, report, and react to indicated time trends.

Third, the Department should continue to study and monitor time trends for the balance of 2008 and adjust model values to January 1, 2009 or as close thereto as possible based on these studies and associated sales ratio statistics. It is important to note that review of individual values can begin as soon as models are finalized. Value overrides would receive the same adjustment factors as other homes in the same model area.

This strategy would permit values to target a period one year later than normal and thus reflect price activity occurring during calendar 2008 with the net result that values will lie considerably closer to the mailing of notices than would otherwise be the case. In addition, capturing an additional year of sales and market activity should improve equity, particularly between properties that experience differential changes during 2008. The strategy also emphasizes explicit monitoring and reporting of time trends, which should be Department staff in a better position to answer queries about market trends deal with interested parties and the public in general.

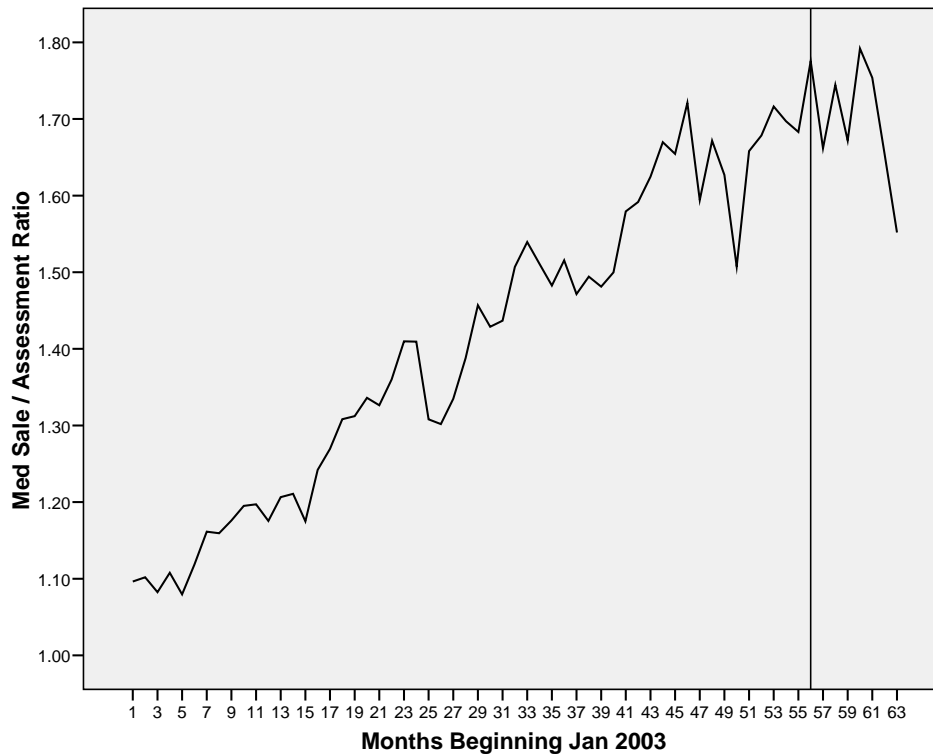
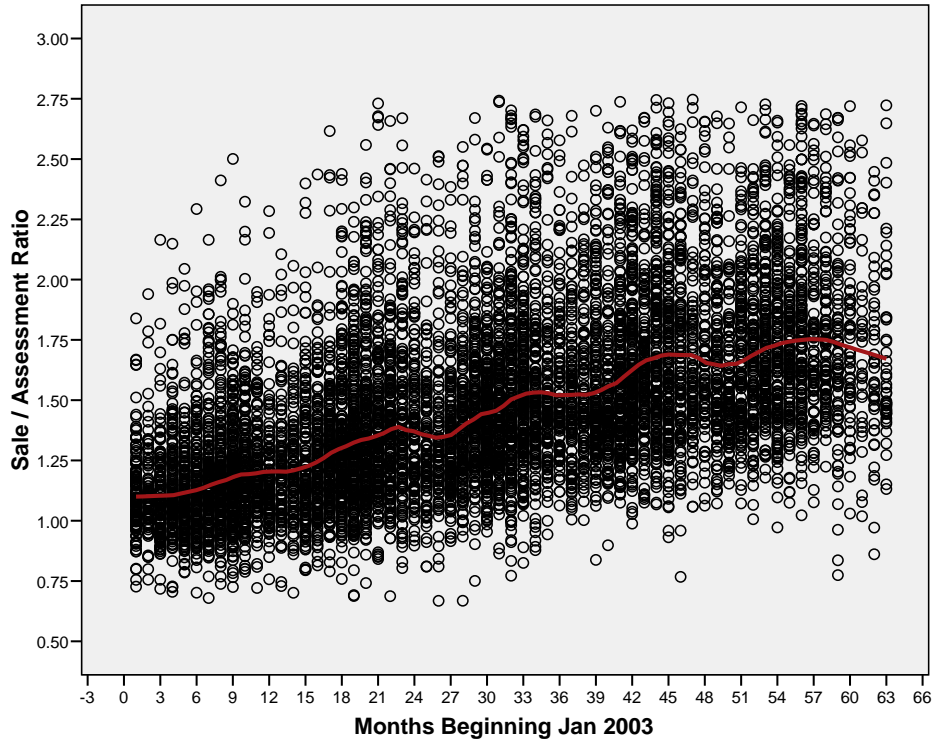
Finally, despite best efforts to keep values as accurate and realistic as possible, values will necessarily increase considerably above current levels (the average statewide increase will be more than one-third of current levels). This of course is due to Montana's six-year valuation cycle, which stands in contrast to recommended practices of keeping values as current as practical. As part of our Phase II work we will discuss strategies for reducing the cycle from six to three years, which on average would reduce such problems to half their current magnitude.

APPENDICES

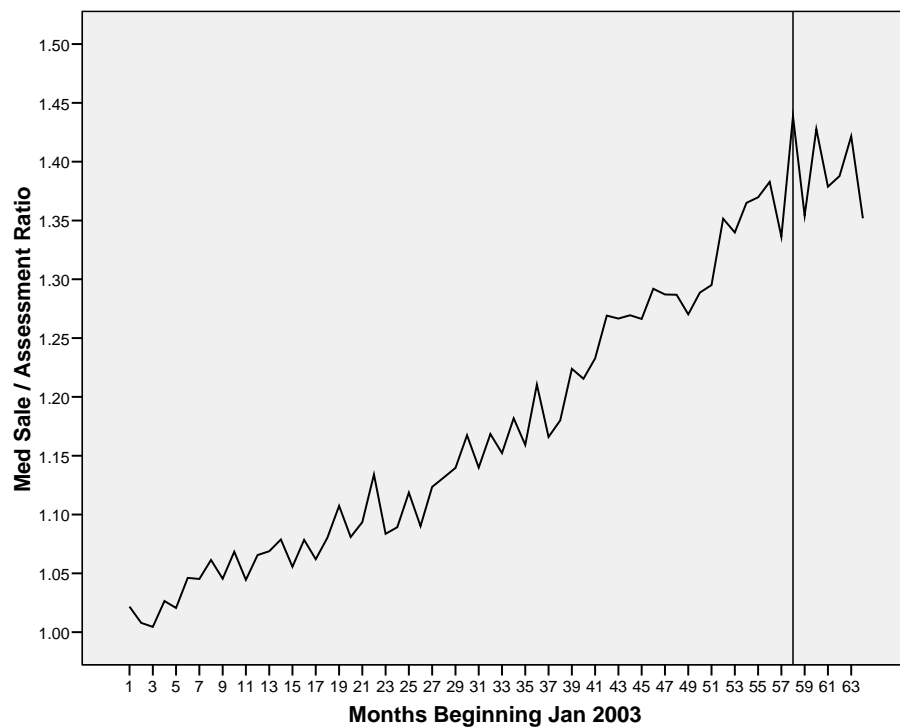
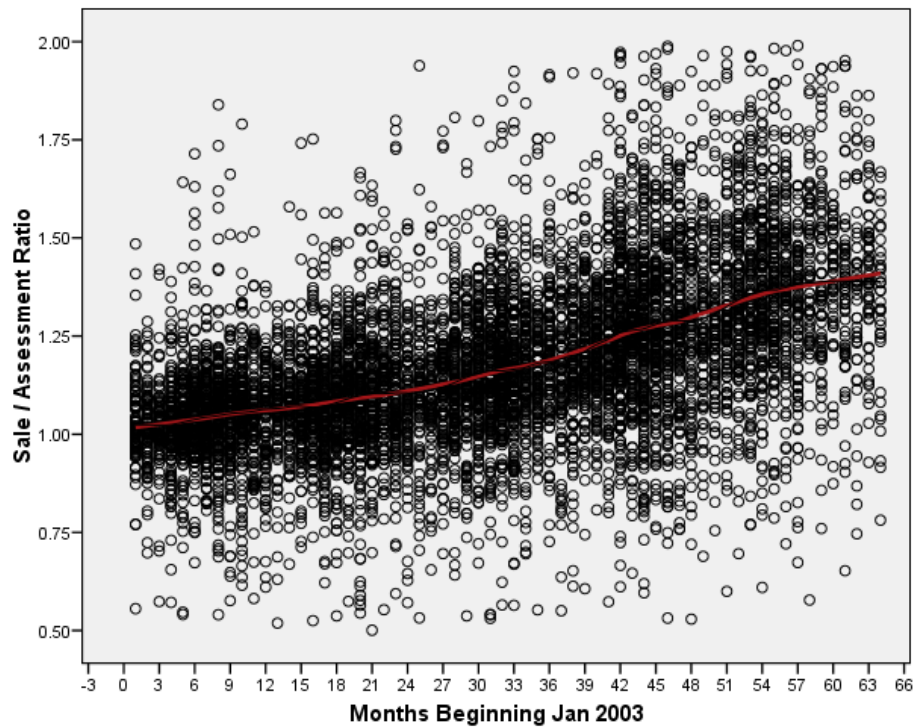
1. Scatter plots of sale-to-assessment ratios (SARs) by time and Economic Area, with a moving average trend line using the nearest ten percent of the data at each point, and line graphs showing the monthly medians of such ratios by Economic Area.
2. Summaries of the regression equations implemented as part of the Sales Ratio Trend Analyses, in which the logarithms of the SARs were regressed on the time variables described in Table 2. The table reports regression coefficients and their “t-values” and significance levels (value of .05 and below indicate 95% confidence or higher).
3. Price index of Montana residential properties, by month since January 2003 and by economic area, for the period January 2003 through May 2008. The indices were constructed from the regression results reported in Appendix 2.
4. A chart showing the Time Adjustment Factors required to adjust sales prices to the end of the period (May 2008). The table is constructed from the reciprocals of the price indices shown in Appendix 3

Appendix 1 – Time Trend Graphs

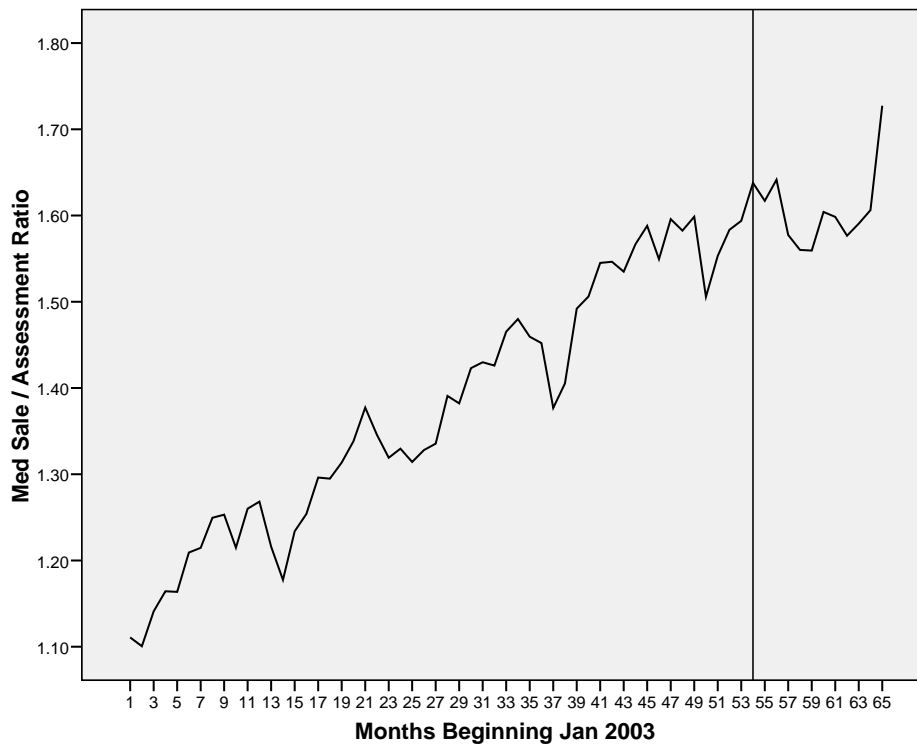
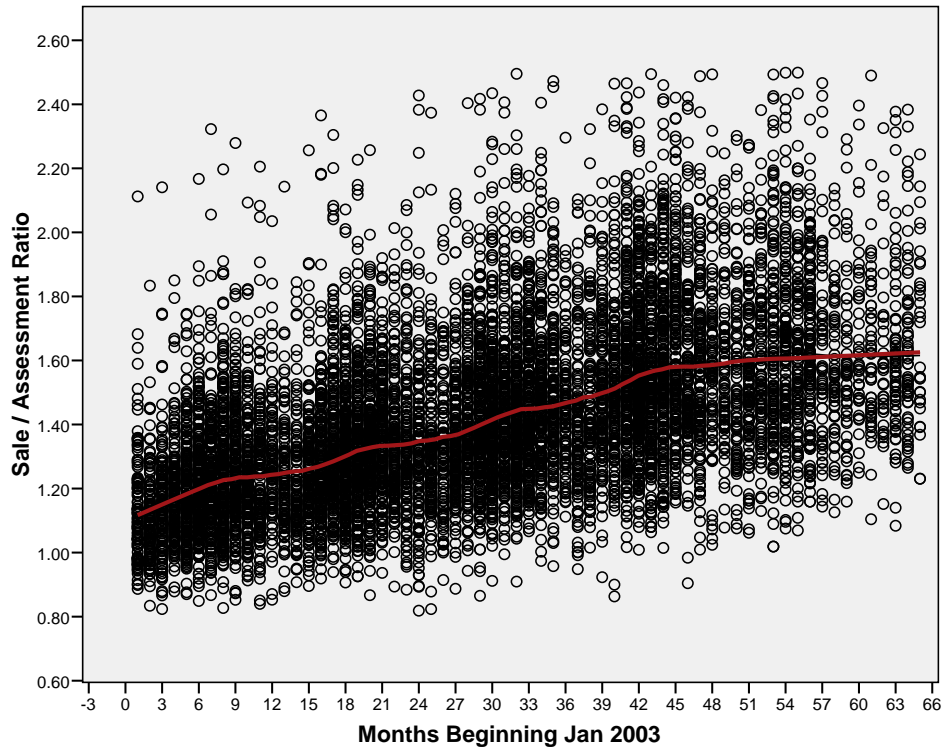
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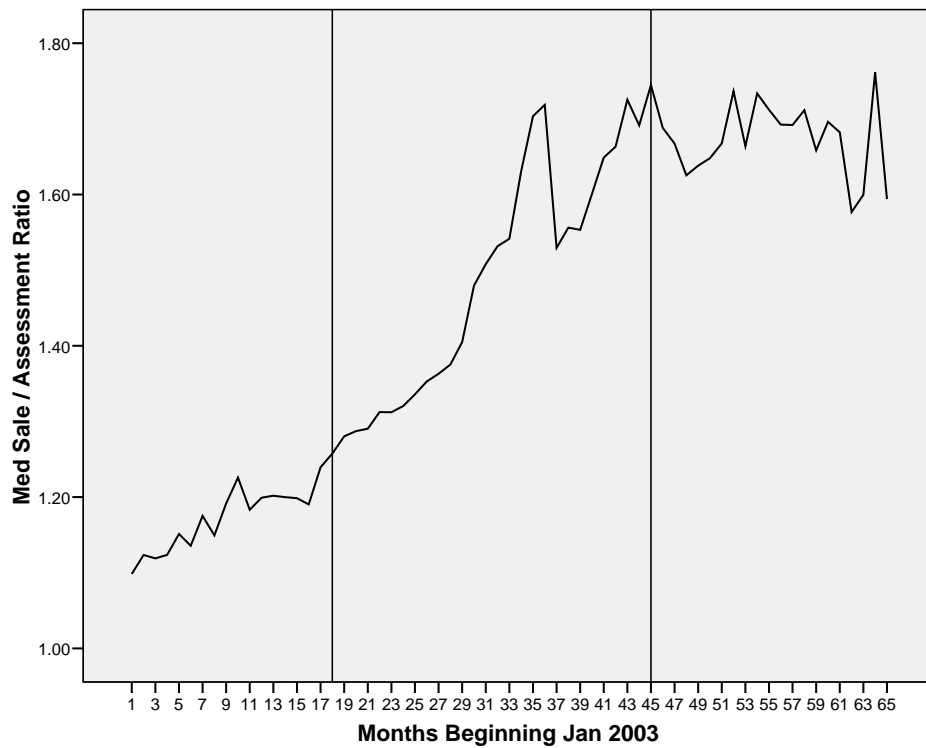
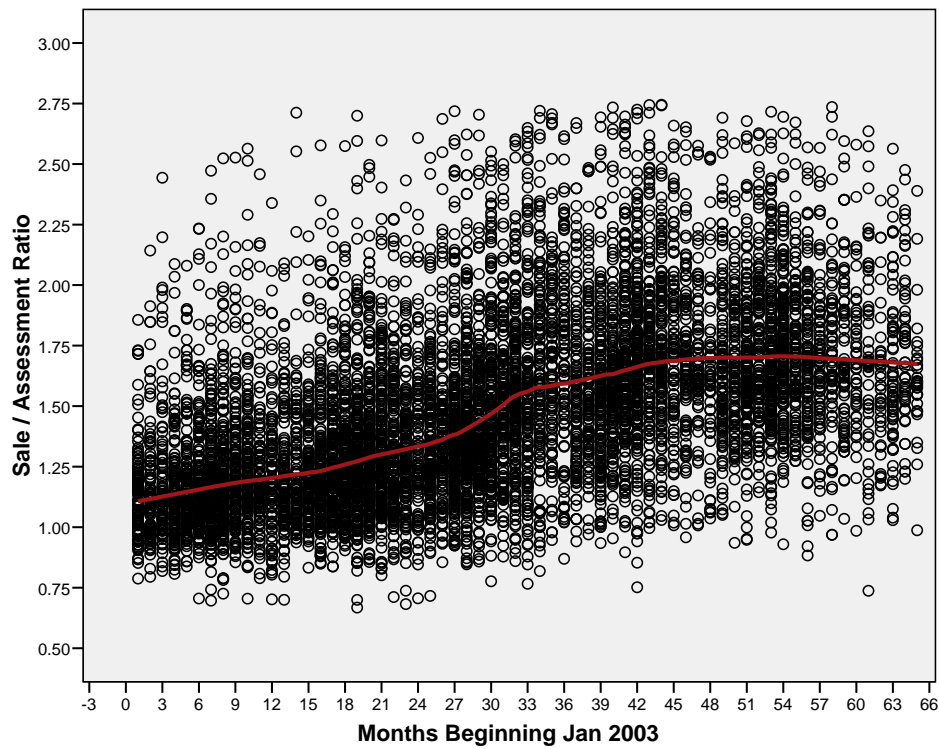
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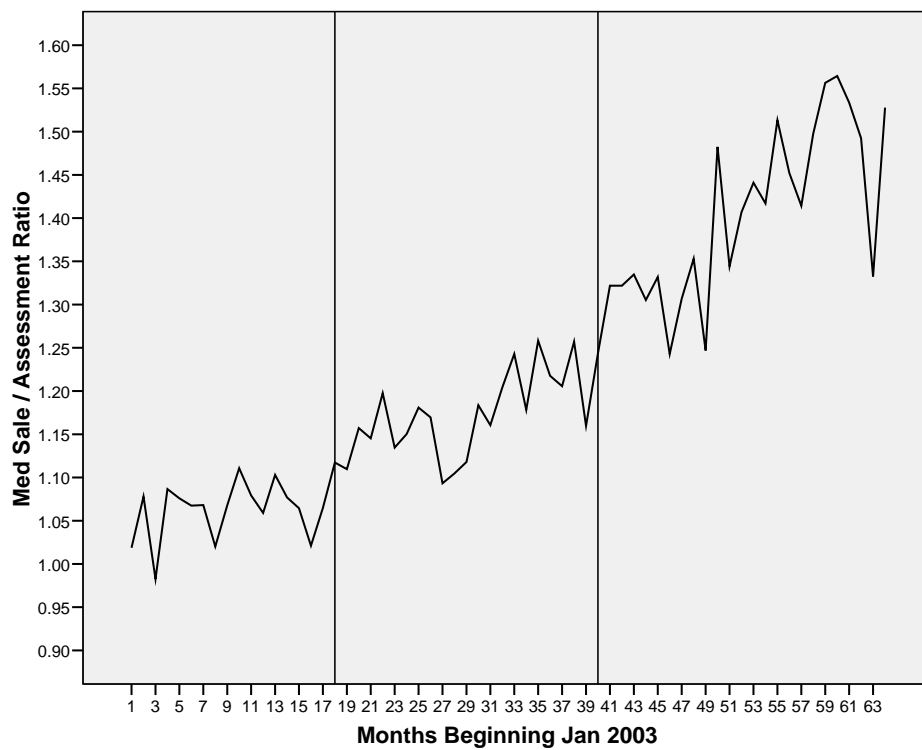
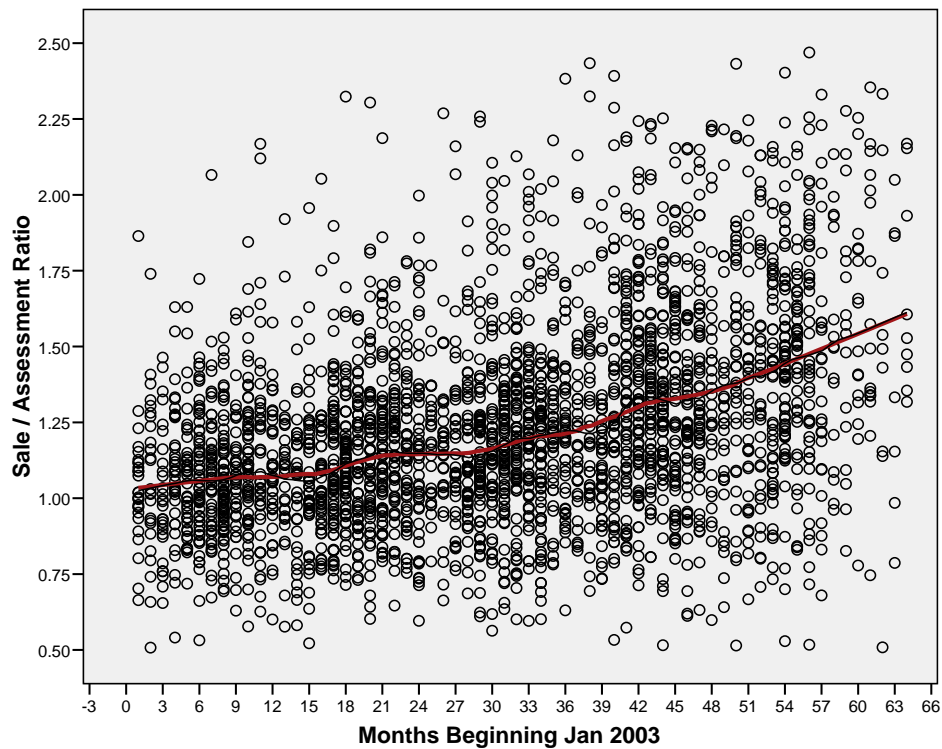
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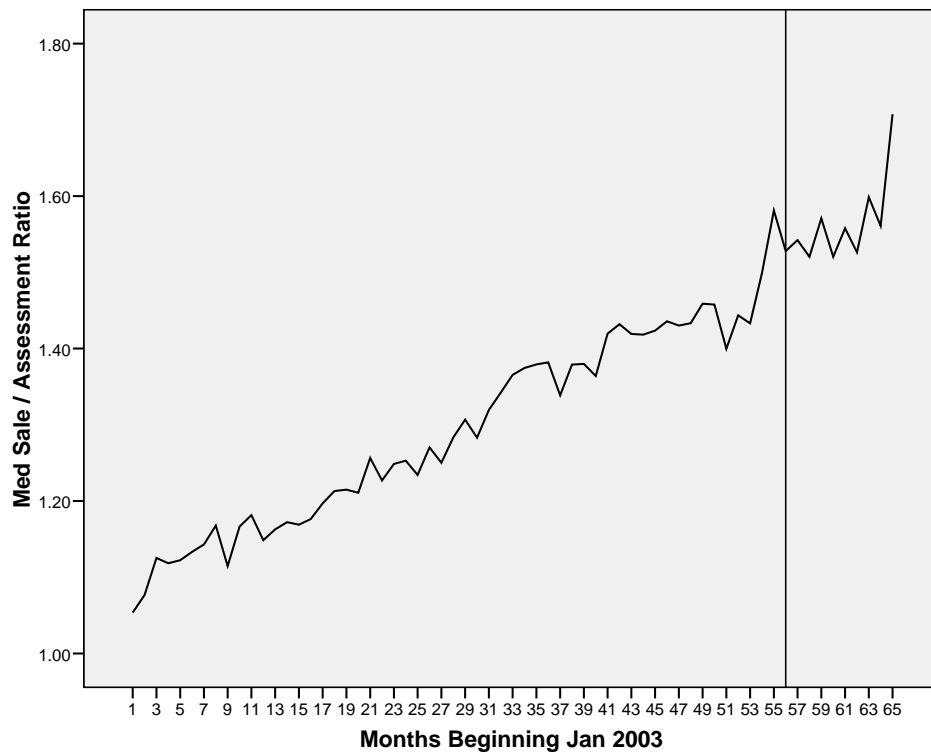
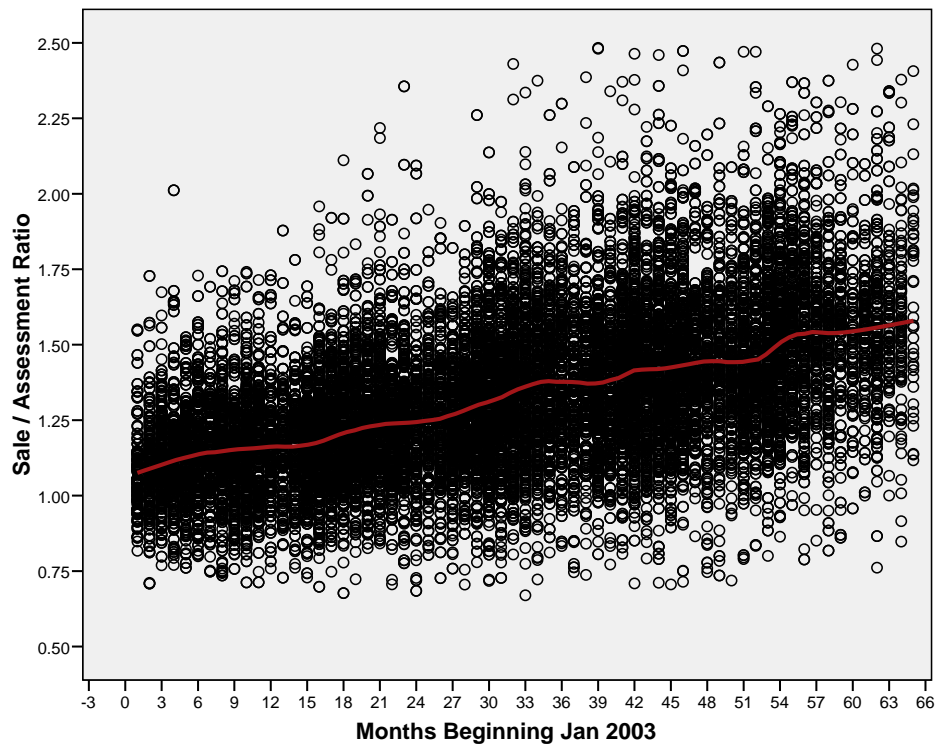
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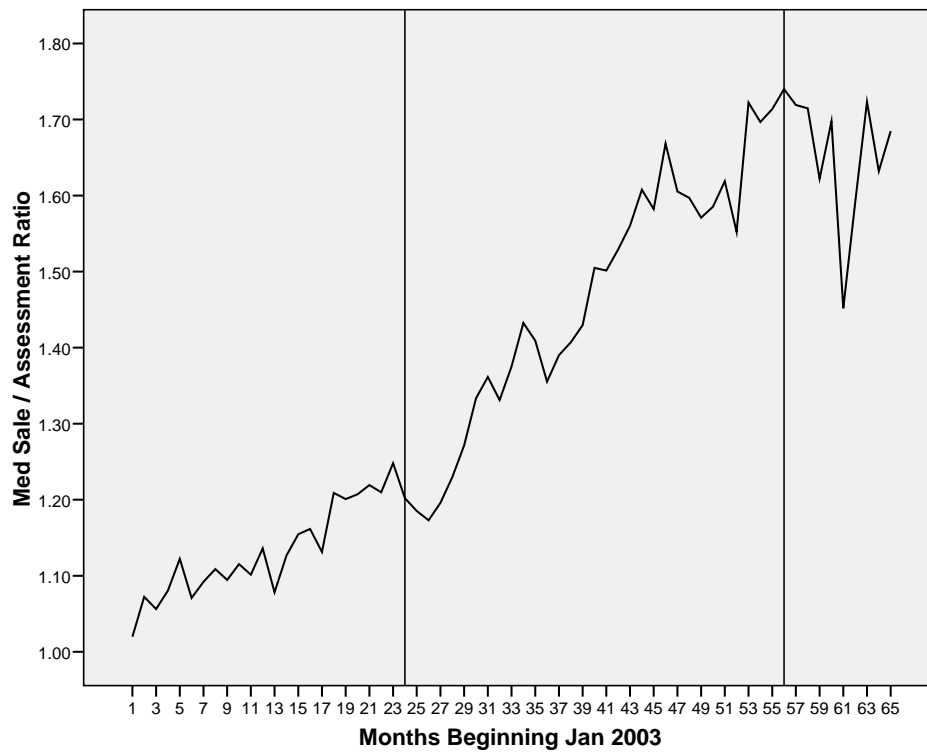
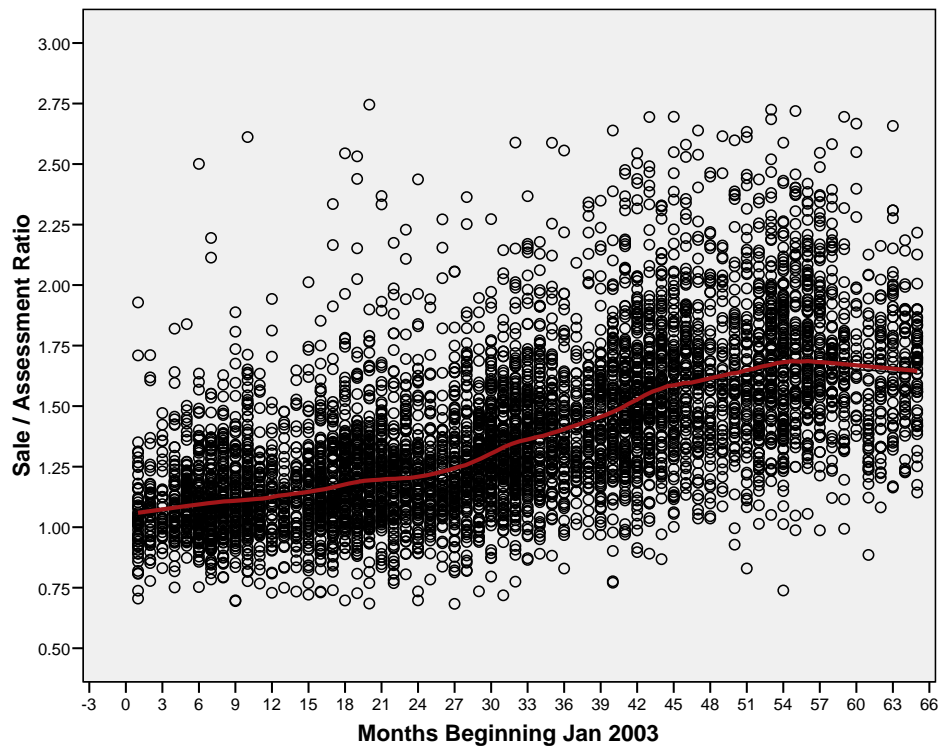
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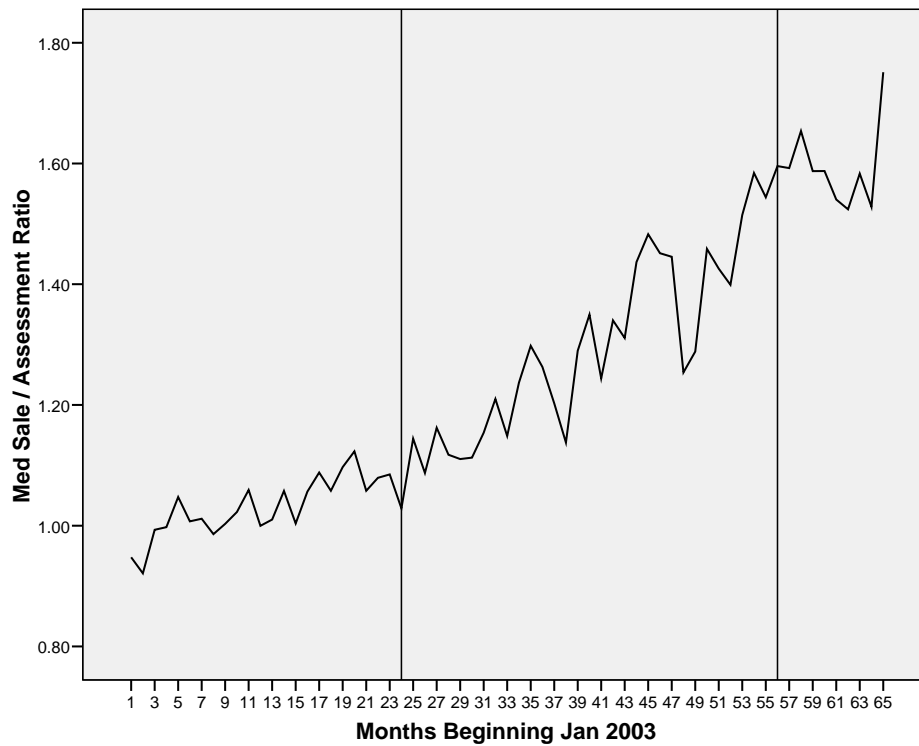
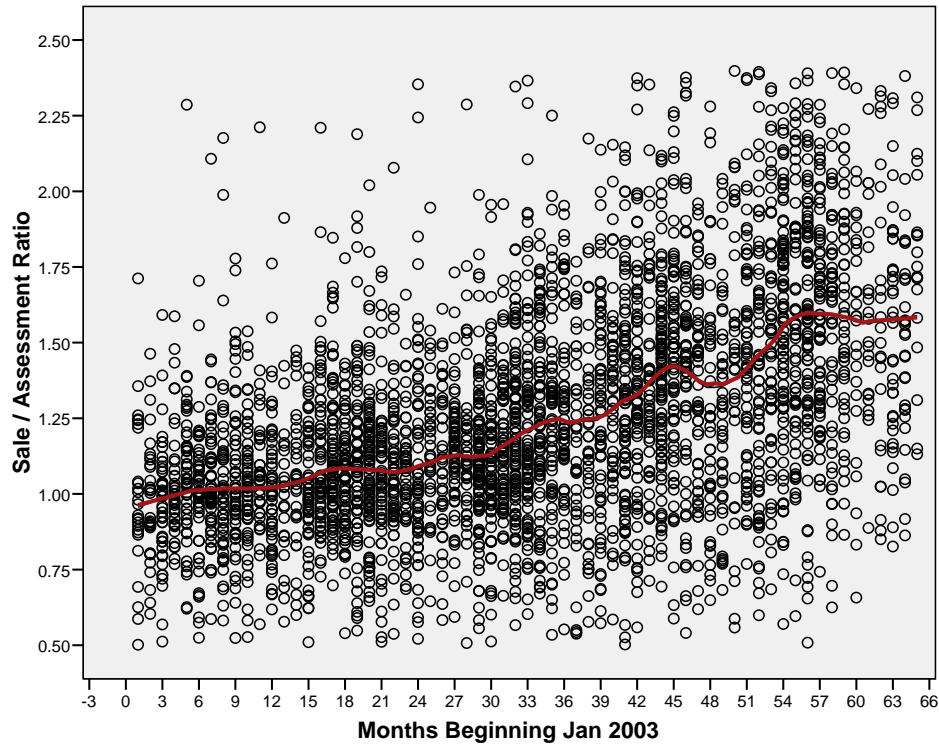
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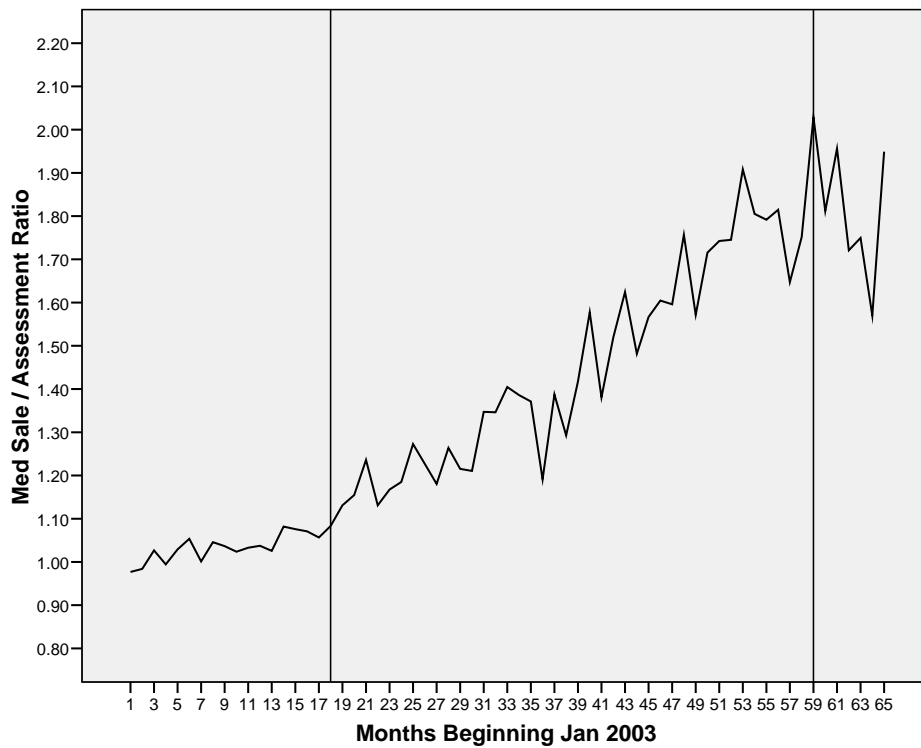
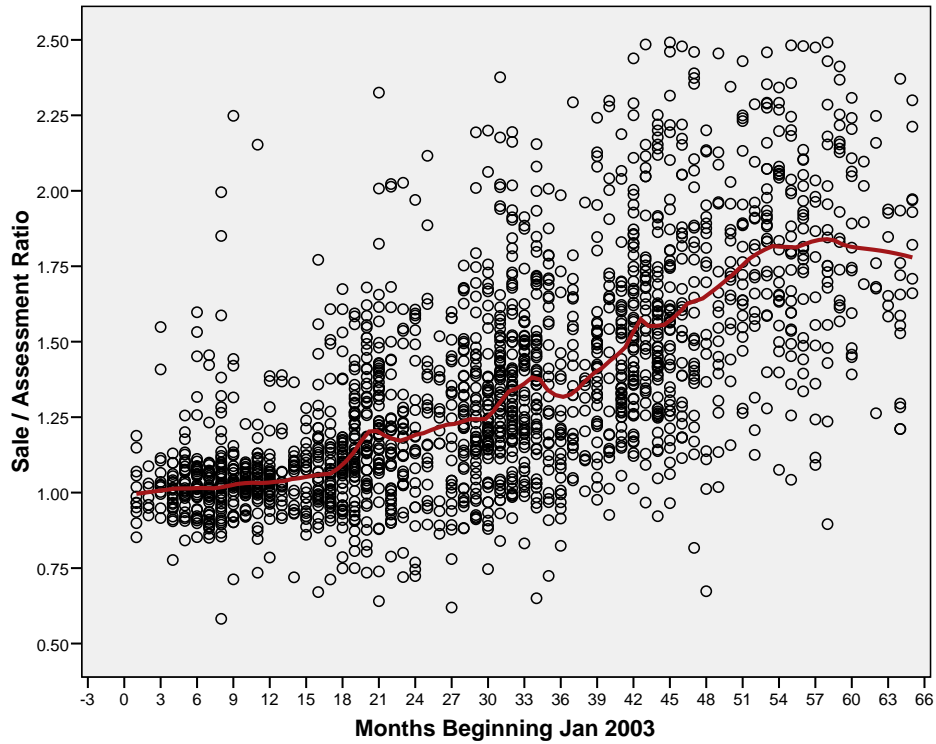
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Area 90



Area 91



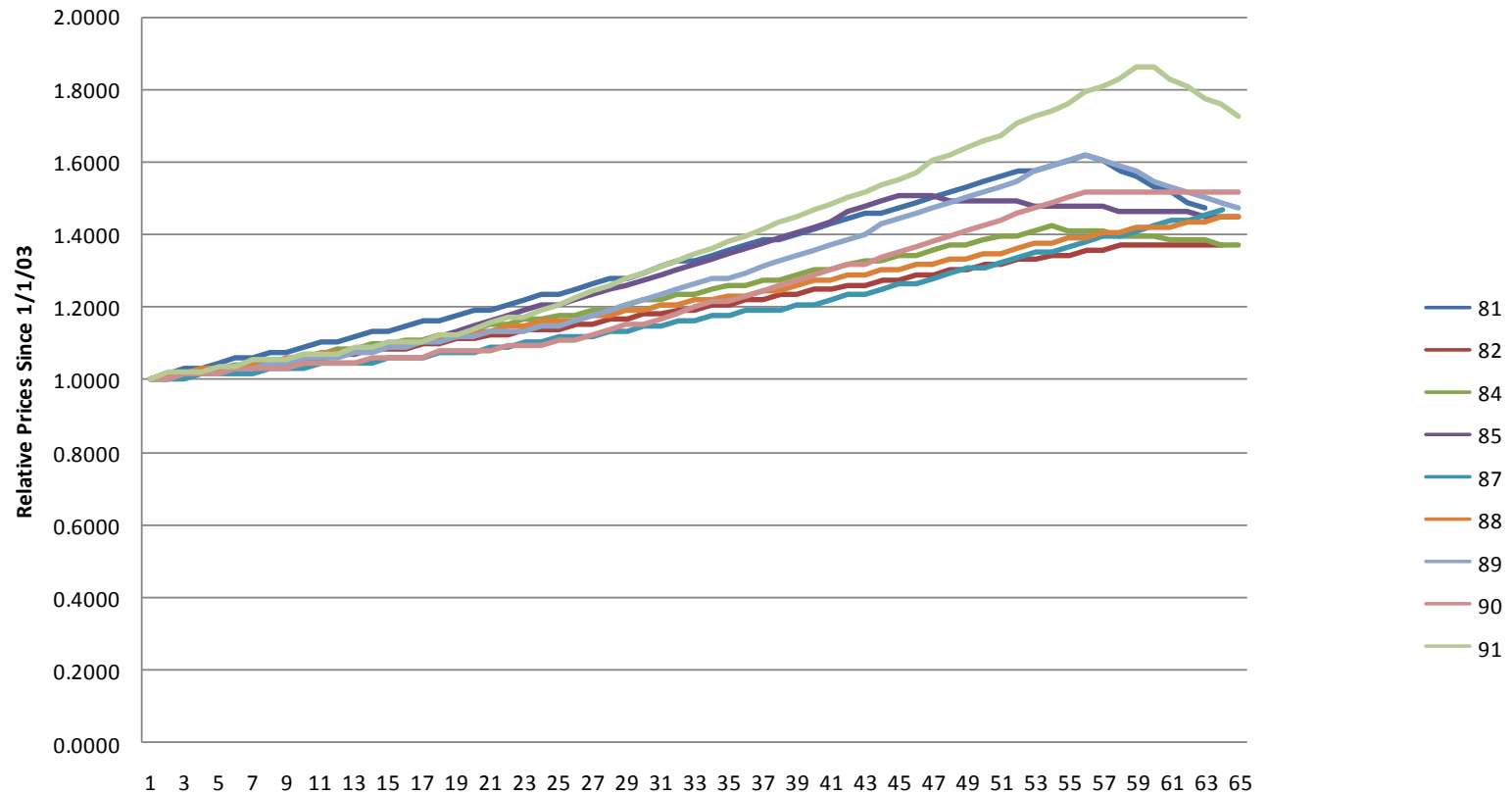
Appendix 2 – MRA Analyses: Results of Regressions of Log of Sale/Assessment Ratios on Months-Since-December, 2002

Economic Area	81	82	84	85	87	88	89	90	91
Adjusted R-Square	0.312	0.248	0.297	0.302	0.138	0.272	0.409	0.227	0.461
Period #1	1/03--8/07	1/03--10/07	1/03--6/07	1/03--6/04	1/03--6/04	1/03-8/07	1/03--12/04	1/03--12/04	1/03--6/04
Period #1 Coefficient	0.009	0.006	0.007	0.007	0.004	0.006	0.006	0.004	0.006
Period #1 "t value"	62.673	50.960	61.958	11.403	3.078	86.056	13.633	4.542	4.810
Period #1 Significance	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000
Period #2	9/07--3/08	NS	7/07--5/08	7/04--9/06	7/04--4/06	9/07--5/08	1/05--8/07	1/05--8/07	7/04--11/07
Period #2 Coefficient	-0.014	NS	-0.003	0.011	0.006	0.004	0.011	0.010	0.013
Period #2 "t value"	-5.302	NS	-3.122	37.830	7.864	4.254	40.525	23.927	31.115
Period #2 Significance	0.000	NS	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Period #3				10/06--5/08	5/06--4/08		9/07--5/08	NS	12/07--5/08
Period #3 Coefficient				-0.002	0.008		-0.011	NS	-0.015
Period #3 "t value"				-3.147	7.882		-6.029	NS	-2.025
Period #3 Significance				0.002	0.000		0.000	NS	0.043

Note: Since the dependent variables in the analyses are logarithms, the coefficients can be interpreted as the indicated percentage changes in price (e.g., a coefficient of .007 indicates inflation at the rate of 0.7% per month). "NS" indicates that the coefficient was not significant at the 95% confidence level and was therefore not included in the model.

Appendix 3

Price Index of Montana Residential Properties By Economic Area Months From January 2003 through May 2008



Appendix 4

